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Some Aspects of Diagnosis.*

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I greatly appreciate the honour of being invited by your President to read a paper before the Midland Counties Division. I have chosen the subject of Diagnosis because it should appeal to us all; as, however, it is such a large one, I have been compelled to limit my remarks by referring to certain aspects of it, instead of dealing with it in a systematic manner. However, I see no reason why, in the discussion which is to follow, members should not enlarge upon the scope of my disjointed survey. I do not want it to be felt that I am delivering a lecture; diagnosis is often very difficult, and I am not half as sure of myself as I was twenty years ago.

Whilst there are different views upon the matter, I think a satisfactory diagnosis may be considered to have been arrived at when we know the exact changes which are taking place in an organ, how these are brought about and how they will affect the future of the patient. If this is to be the usual standard, then individually and collectively as time goes on we shall make progress. If, however, such diagnoses as heart, kidney or skin disease, foot, shoulder or stifle lameness, gastritis, rheumatism, colic, eczema and chronic diarrhœa satisfy, then I am afraid my remarks will sound rather pedantic. Some years ago at an annual meeting of the British Medical Association, Prof. Drummond made an attack upon the diagnoses of his confrères, and although I should not like to have to do it, I firmly believe that a little "ginger" every now and then would do us good. When three or four veterinary surgeons meet in friendly discourse, one can sometimes hear in an hour or so more of errors of diagnosis than appears in our periodicals in twelve months. Many practitioners are single-handed and surrounded by an admiring staff and clientièle; this unfortunately fixes their early opinion of themselves, and it is almost bordering on *lèse majesté* to ask Why? or How? Many of us are not big enough to have our mistakes broadcasted, yet if everything possible is done in order to arrive at a correct diagnosis we should have little to fear. It is that "everything possible" that I want to enlarge upon to-day. The highest medical and surgical authorities, from time to time, relate or describe cases showing how, despite experience and every care, a wrong diagnosis was made. Unlike the practitioners of human medicine, we have few figures to go upon, but I think it is safe to say that at least some of us are sometimes wrong. I can only emphasise the importance of the subject by quoting the aphorism that "diagnosis is the first principle of treatment." Perhaps diagnosis, as diagnosis, does not receive the attention it should in some of our schools, and we lack suitable standard works on general diagnosis; at any rate, I do not know of any in common use which may be regarded as students' companions. In human medicine there is hardly a disease of importance, or an organ or tissue, which has not several valuable works devoted solely to the diagnosis of that disease or the diseases of that organ or tissue. Moreover, there are many books on diagnosis generally, and some devoted to a special method of detecting disease in different organs and tissues.

I have been told by energetic young graduates that they have to be extremely cautious when trying to introduce what they term up-to-date methods, because their seniors are very apt to sigh for the good old days of practical men, and often refer to their present assistants as useful book and microscope men who are lost in front of a patient. This attitude is unfortunate, and many who adopt it are great exponents of their own powers of detecting anthrax bacilli with the self-same despised microscope. I once heard the type of practical man referred to above, described as one who had a pet sign for every disease, which would not work when others tried it. Hence arose the secret mysteries of the practical man. Within reason, anyone can pour medicine into an animal, but diagnosis is on quite a higher plane. Time spent in determining the exact nature of an abnormality must give better results, increased interest and therefore enhanced usefulness to owners of animals.

There are many aspects of diagnosis—medical, surgical, obstetrical, and these vary in the different species we are called upon to treat. I am told that the meat inspector often has a difficulty in arriving at a diagnosis when he has the carcase split, and the viscera in front of him, and that as a result he is full of sympathy for the practitioner, who has to diagnose similar cases when on their legs, by applying his knowledge of the "pathology of the living." Our patients do not actually speak, but we have few alcoholics, malingerers and neurasthenics, and rarely come across such cases as "thirty bob a week compensation and a stiff back," which, doctors say, want a lot of diagnosing.

I must revert for a few moments to books. I have derived considerable enjoyment from several works on human medicine, but I will only mention two. *Clinical Methods*, by Hutchinson and Rainey, now in its eighth edition, is an excellent little treatise, which preaches system and deals with the methods of examining all the important organs and their products. *Elements of Surgical Diagnosis*, by Pearce Gould, and now in its sixth edition, is a companion volume dealing with surgical conditions. I am afraid that of

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the few books in English on diagnosis one cannot speak very highly. *Outlines of Clinical Diagnosis of the Internal Diseases of the Domestic Animals*, by Malkmus, translated by White, may, however, be considered a useful introduction. The best work, to my mind, is Marek's *Klinische Diagnostik der Inneren Krankheiten der Haustiere*; the second edition runs to over 800 pages and is well illustrated. It is not a hopeless task to make out a useful amount of information from it by means of a German dictionary. For surgical conditions Moller's *Klinische Diagnostik der Ausseren Krankheiten der Haustiere* is a good little work in its sixth edition. Monvoisin's *Précis de Diagnostic Medicale*, despite its title, deals with veterinary matters, and is suitable for those who read French. Whilst enough has been said concerning books, allusion must be made to Gray's translation of Nicholas' *Ophtalmologie Vétérinaire et Comparée*. The original contains coloured plates of ophthalmoscopic views of the fundus of the eyes of our patients, which were not included in the English version owing to the outbreak of war in 1914.

Generally speaking, the interrogation of the attendant upon the previous history and present illness should be brief and to the point. Continental writers lay down the exact questions to be asked, so that one may get accustomed to them and thus avoid such howlers as "Well, what's the matter with your dog?" The general examination should include all the systems, unless it is absolutely obvious that they are not involved. This examination should be sufficient to implicate or exclude and, finally, strict attention should be paid to the one or two systems primarily involved. If this were always done it would help to lessen the chances of calling laminitis in the horse, and gathered nail in the cow—pneumonia. The same general routine would soon establish what appears to be often absent, *viz.*, method and system. I have said above "systems primarily involved," but it is often extremely difficult to distinguish primary from secondary disease. We see an example in the so-called intermittent heart of the horse which clears up when the cause of the trouble in the alimentary canal has been removed. As long as we recognise the effects of the impairment of one organ on the whole organism and bear in mind the vicious cycle of primary and secondary conditions we shall be more or less protecting ourselves against error.

In abnormalities of the skin an attempt should be made to use the causes underlying such manifestations as irritation, redness, increased heat, swelling, pain, and special lesions. These, taken with one eye on the alimentary canal and its liability to stasis and intoxication, are often a great help in constructing some form of clinical classification. If to these be added the use of the hand lens, and the microscope, the chances of mistakes are considerably reduced. The labial reflex is often given too much value in detecting the presence of parasitic skin diseases—in fact, some regard it as being indicative of one only. There are many conditions in which it is seen; some animals can be induced to respond without the skin being touched, and others can soon be taught not to do it even when asked to. Psoroptic mange in its early stages is often mistaken for "ringworm" unless a scraping is examined. In dogs, even though the microscope is used *Achorion* is often missed if one relies on simple examination in caustic potash solution. On the other hand, the demonstration of *Demodex* does not mean that the dog should be destroyed for so-called incurable follicular mange. This parasite may be found in normal skins and in a large number of more or less distinct clinical conditions from *pruritus simplex* to the typical *pyo-dermatitis*. Allusion must be made to symbiotic mange of the horse; it is probably one of the most important diseases of the hairy-legged breeds, and is the foundation stone upon which a long list of conditions is built. Many abnormalities of the feet, limbs, spine and other systems ought often to be diagnosed as "due to" or "caused by chorioptic mange." This subject alone would be sufficient for an interesting paper, in dealing with which I should be more happy than with the present one.

Lameness will always offer difficulties, especially in animals which are not easy to handle and to make go at different paces. When inspection, palpation, percussion and exclusion do not avail, the stethoscope on a joint will sometimes help; a high-heeled shoe may clear up some points and rectal examination has its uses in hind limb cases. Although there are some skins which will defy the hypodermic needle, local anæsthesia at different points of the fore limb is often valuable. It, however, has its limits. Like all other diagnostic aids it must be most carefully carried out. Cadiot and Almy(1) give the following table of seats of injection for locating in a general way lamenesses of the fore limb.

1st injection on the median and ulnar nerves.	If the lameness persists it is in the shoulder or arm.	If the lameness persists it is in the cannon, knee or inferior part of the forearm.
	If the lameness disappears the 2nd injection is made on each side at the seat of high neurectomy.	If the lameness disappears it is below the fetlock.

Other schemes involve more injections. A half per cent. of novocain in suprarenin solution (1 in 1000)—10 c.cs. on each nerve—is recommended as a suitable local anæsthetic. The objection that this procedure takes too much time has little weight when one thinks of the possibilities of having a patient fired and blistered on one part, returning from grass with a well-developed lesion some distance from the treated area. It is now many years ago since Bouley said that the diagnosis of lameness was a three-stage problem, *viz.*, which limb? which part? and what causes it? The nearer we try to keep to the answers to these questions the better become our results.

In the mouth it must not be forgotten that a focus of disease may be responsible for manifestations of a general nature. A good gag and proper illumination are essential to detect early changes. Thanks to the

work of J. F. Colyer, M.R.C.S., W. L. Little, and F. T. Harvey we know more of alveolar periostitis than formerly. Colyer(2) showed that out of 500 horses dying in London 166 were affected. It is quite common and often missed unless the torch and long nail of the finger or horse nail are carefully used to detect spaces containing chaff. It seems to me that quidding is due to alveolar periostitis alone, and not to simple irregularities on the outer edge of the upper and inner edge of the lower molars. It is wonderful how many teeth can be removed with satisfactory after results if a little care is devoted to feeding. Inspection, palpation, percussion, and auscultation must be extensively practised upon the normal cavities and organs before they can be of real value; there is a constant difficulty, for each of our species gives different results. Abnormal sounds are distinctly useful, but mistakes often happen when lesions are bilateral, or normal sounds are lessened or augmented. With the above training and outlook the chest should not be such a box of mystery as some would have us believe. Nevertheless, one will not always be right. A consideration of the cough—self manifested or produced by the hand—is not without value. I have been told by some practitioners that they can gauge the internal temperature without the use of the thermometer; this seems to me a quite unnecessary effort, and the time devoted to this end might have been much better occupied by increasing the powers of touch, sight, hearing, smell, voice, memory and intuition. By these means we shall be prevented from diagnosing a horse with a temperature of 106 degrees F., pulse 70, and respirations 40, as pneumonia in the evening and finding the animal normal next morning. Elam(3) states that in pleurisy with effusion in the horse the hairs of the mane and tail are easily pulled out, and that as resolution takes place they become firm. I have not found this sign to be of any value, but I should like to hear the experience of others who have tried. On the other hand, paracentesis thoracis is quite safe if carried out early.

In the small animals palpation is of great value in detecting diseases of the abdomen. Success depends upon the detailed manner in which it is carried out. By it one can locate pain, enlarged organs, foreign bodies and tumours. It is well here to remind oneself of the clinical features which distinguish the five "f's" *viz.*, fluid, food, flatus, fat, and fœtus. Although it is better to arrive at a diagnosis from the outside, exploratory laparotomy is often of great value. With the gloved hand and care it is safe in the small animals, and one has seen obscure cases improve almost immediately after it. This has long been known in human surgery and was even practised as a form of treatment for tuberculous peritonitis. One naturally feels that in the ox the rumen might be entered from the flank more often than it is, with satisfactory results.

Rectal examination largely supplants palpation of the abdomen in cattle and horses. The value of it in acute abdominal pain, urino-genital cases, obstetric work, tuberculosis and obscure conditions cannot be over estimated. Correctly carried out, it furnishes information which cannot be gained by other methods. It is doubtful whether one has done one's duty if the rectum of a certain type of case has not been explored. If a diagnosis of "colic" without knowing what is going on inside, suffices, then perhaps it is hardly worth while going to see the animal when the attendant has given a good description with the calling up message. The stomach tube, in addition to being the best method of giving liquids, enables one to ascertain the state of the stomach. Those practitioners who have been alarmed at the epistaxis which sometimes follows the use of the ordinary tube, will find a small foal tube very suitable to commence operations with. Whilst no doubt we are often right as far as we go in diagnosing certain clinical pictures as impaction of this or that portion of the double colon, one feels that it is a little hard on the horse in many such cases to blame him for having a part too narrow for his requirements, and it seems just as unfair to accuse a diet which he has been taking for years without injurious effect. When one takes into consideration the distribution of the anterior mesenteric artery and the prevalence of lesions in it due to *Strongylus* it seems only proper that thrombo-embolism should be regarded as the actual cause of many "common colics." The alteration in intestinal movements, even pending the establishment of an alternative circulation, must lead to paralysis, stasis, tympany and altered position. Cases which do not clear up in the usual way, or which afterwards show great loss of flesh, are often veritable cases of thrombo-embolic colic. I need not mention here that the abrupt termination of a hæmorrhagic portion of small intestine is not very often "a twist which has come undone," but most likely belongs to the type of case now being described. I am afraid my experience of the bovine stomachs is small, but I have been impressed by the different views expressed on the same case by experienced men as to the interpretation of the various signs. In some instances they have been equally at variance even at the *post-mortem* examination, one going away satisfied with what has been found, and the other regretting that the brain had not been examined. Perhaps these cases can be explained by a cramped view of the patho-physiology on the one hand and a lack of imagination of the differences of the normal during life from the normal after death. Large milk clots in the fourth stomach, and the state of the omasum are two such points.

Gastritis is a common diagnosis in the dog, but it seems doubtful whether all the cases so diagnosed are really primary lesions of the stomach. I think some are due to intestinal intoxication following stasis, and some may even be due to metritis or septic mouth. We want information on the percentage of acid in a test meal before we can diagnose hyper, hypo, or achloridia; there is, however, to my mind, no doubt that a finding of gastritis is often commencing in the middle or near the wrong end of the story. Gastro-intestinal lavage, which I prefer to refer to as recto-œsophageal lavage, although a therapeutic measure, has a certain amount

of diagnostic value. According to E. A. Ehmer(4) "Washin' 'em out" is far too common in America.

In diseases of the alimentary canal the ordinary diagnostic aids can be materially assisted by careful macroscopical, microscopical and chemical examinations of the vomit and fæces. Vomit, if acid, will turn blue litmus red; free hydrochloric acid gives a blue colour on Congo red paper and the colour reaction is roughly proportional to the amount. Bile is distinguished from blood by the green colour, which becomes apparent on dilution. Fæces vary in colour, amount and consistence in the different animals and according to diet. The absence of bile is indicated by a 10 per cent. alcohol solution of iodine giving no colour reaction at the junction of the two solutions. Parasites can often be demonstrated by adding water to the dung in a pudding dish. Microscopically one can shew the presence of worm eggs; trematodes (from the liver), cestodes, and nematodes. Larvæ from the lungs may also be found in fæces. Hall's *Diagnosis and Treatment of Internal Parasites*, should be very helpful because it contains diagrams of the eggs of most of the worms of the animals we have to treat. In cases suggesting the presence of worms it is much better to be sure than to guess, be wrong, and get no result from treatment. When acid-fast organisms are present they can often be detected by suitable staining after antiformin treatment. Fibre from string, cotton from material, hair from pica, and undigested portions of muscle are often found in the fæces of ailing cats and dogs which get well when the sources of the "finds" have been cut off. Sputum, properly taken, affords a good means of diagnosing certain diseases of the lungs and bronchi. Acid-fast and other organisms, worms and their eggs and histological elements may be found in it. In cattle it can often be collected from a freshly whitewashed stall front of an isolated animal. German writers figure sputum catchers; a wooden spoon is sometimes useful. There is a clinical condition in calves often diagnosed and treated as hoose, in which the lungs contain no worms. The examination of the urine furnishes the practitioner with important information bearing not only upon diseases of the urinary tract, but upon the state of other organs. Frohner(5) in his introductory remarks on the examination of the urinary apparatus says what practically amounts to the following:—

> "The exact investigation of the urinary apparatus, *viz.*, by means of the urine, is for the diagnosis of kidney and bladder diseases of the highest importance. As auscultation and percussion for heart and lung affections, as the ophthalmoscope for eye diseases, and the thermometer for the detection of fever, represent indispensable diagnostic aids, so is urine examination the only sure way to show the presence of diseases of the urinary tract. For this reason this aspect of diagnosis must be not less cultivated and practised. It happens also that an examination of the urinary apparatus brings out the presence of other pathological conditions such as Anomalies of Metabolism (sugar in the urine), Blood Changes (Hæmoglobinæmia), Circulatory defects (Albuminuria), Digestive derangements (Alteration in the reaction of the urine), Poisoning, and so on."

The detection of the above changes in the urine is not difficult; cells, casts, and crystals when found all add to our knowledge of what is going on in these organs. Craig(6) gives an account of two cases of nephritis in horses diagnosed by urine examination. Neither animal shewed tenderness of the loins or kidney, two signs which are often regarded as of great value in dealing with these organs. It seems quite likely that a test for albuminuria in those cases of so-called milk fever complicated by fits, would yield valuable information which would considerably alter the prognosis of the case. Perhaps we are seen at our worst in the detection of diseases of the nervous system, yet Marek (*loc. cit.*) gives 78 and Frohner (*loc. cit.*) 108 pages on this subject. With a knowledge of the motor areas, and nerve centres of the brain and the sensory areas of the skin, and by using the reflexes, one is in a position to make a general examination of this system. A revision of one's knowledge of the anatomy and physiology of the brain, spinal cord, nerves, and sympathetic system would, I feel sure, lead to an increased number of nervous conditions being recognised. Only recently I saw a typical case of bilateral paralysis of the motor branch of the fifth cranial nerve in a dog. The ophthalmoscope will often help in settling whether an obscure case has a brain tumour, and X-ray may nail down a suggestive case of anterior poliomyelitis. Whilst keenness of vision, hearing and smell have become proverbial in some of our patients, the certification that an individual does or does not possess these senses to a normal degree, is a matter which calls for painstaking tests. A modern outlook should remove a number of rough and ready diagnosis—such as staggers—from the nomenclature of nervous diseases. The value of the ophthalmoscope is, I think, now well recognised, yet one feels that its use is not so general as it ought to be. If seeing is believing, then here is an instrument which should make us believe most wholeheartedly. It gives indications of diseases outside the ocular globe. I think that a microscopical examination of a removed tumour would in many cases be of value to an owner and would at the same time prevent a veterinary surgeon from being blamed for not completely removing the growth, which was shewn to be malignant.

A simple blood smear, suitably stained, will often reveal variations from the normal, either in white cells, red cells, or the presence of corpuscular and plasma parasites. In Burnett's *Clinical Pathology of the Blood*, we have a useful little work dealing with our patients, with chapters and coloured plates on the normal, as well as the important anæmias, the protozoon parasites and the changes produced by worms and other parasites.

Horning and McKee(7) have recently described their method of taking the blood pressure of the dog at the femoral artery. They give a table of normal systolic and diastolic pressures for animals of different

weights, and lists of diseases in which there is hyper or hypo tension.

Radiography is well recognised as a means of detecting fractures, dislocations, calculi in the kidney, bladder, male urethra and salivary glands in the small animals. It is also valuable in locating arthritis and other diseases of bone. By the injection of solutions which are opaque to the rays, hollow organs can be outlined. After a fast and the administration of sodium tetra-iodophenol-phthalein the gall bladder can be radiographed or watched as it empties after a small portion of butter has been eaten. About half term the bones of fœti may be demonstrated. X-ray can be of considerable value in tracing the origin of obscure sinuses and fistulæ. A substance opaque to the rays, such as lipiodol, is injected, and the course is then shewn up. The bismuth meal has been used in cats, and there are possibilities in its application to the alimentary canal of the dog.

Radioscopy—screen work—is not much used in our patients, but it could be employed for detecting movements of the diaphragm or to ascertain whether the Fallopian tubes are patent, after air has been injected into the uterus under pressure. There is, I think, a considerable amount of room for an extended use of methods of internal illumination or, more correctly, endoscopy. Continental authors frequently figure instruments for this purpose. The auroscope, or torch in the mouth or nasal cavities, hardly falls within this category. I refer more particularly to deeper views, such as those of the sinuses, guttural pouches, and larynx of the horse, stomach, bronchi, uterus and bladder in canines, and the uterus and bladder of the other common patients. Horning and McKee have already written extensively on bronchioscopy and œsophagoscopy in dogs; a reprint of one of their recent papers appeared in the *Veterinary Journal* (8) for June. Apart from the diagnosis of disease, the detection of foreign bodies (non-opaque ones are not shewn by X-rays), they use endoscopic methods for swabbing out the bronchi in mechanical pneumonia and for the treatment of uterine affections. They claim that there is a daily use for instruments of this nature. Unterspann(9) has likewise emphasised the value of the instrument, which he terms the gastroscope, in canine practice. Frese(10) has devised a rhino-laryngoscope which gives a clear picture of the horse's larynx.

Whilst I am not anxious to deal with individual diseases, those which are scheduled by breed societies and the Horse Breeding Act are extremely important. They are usually termed hereditary diseases. Some of them no doubt are, but a large amount of experimental work will have to be done before everyone will accept the view that all of them are. A diagnosis concerning hereditary disease may affect generations of animals yet to be born. My remarks here apply more particularly to horses. The certification of freedom from hereditary diseases is, after all, based on a search for such diseases and finding that they are absent. In this respect it is essentially diagnosis, and should be as exact as possible. One hears the results of examination at shows discussed in a manner similar to the awards. If there are differences of opinion upon sidebone, ringbone, spavin and navicular disease, some researches should be instituted by breed societies as to the practicability of using X-rays. The subject is serious enough to warrant this step. It isn't everyone's *forte* to be able to certify an animal free from hereditary disease between the salmon and beef of an agricultural show lunch. Although stringhalt is no longer considered as a disease in itself, but as a syndrome indicating tarsal arthritis, changes in the fascias of the leg and thigh, patello-femoral lesions and perhaps nerve changes, what is winked at in one breed is considered intolerable in another. If roaring and whistling are due to a paralysed cartilage, we have an instrument by means of which we can see the larynx. These are two diseases which, it is maintained with much force, should not be regarded as hereditary, but that is not a matter for us here. There is, perhaps one other group of diseases to which allusion ought to be made, *viz.*, those scheduled under the Diseases of Animals Acts. I shall only refer briefly to three, *viz.*, parasitic mange, anthrax, and tuberculosis.

Parasitic mange has decreased considerably owing to the efforts of local authorities, and this reduction has been very marked with regard to the psoroptic form. The Parasitic Mange (Amendment) Order of 1918 allows animals affected with psoroptic mange to be worked. I am persuaded that as a result many cases of sarcoptic scabies are not fully investigated, but are "diagnosed" as psoroptic. This is very undesirable, and perhaps therefore the revocation of this Order, which is desirable on other grounds, would tend towards a more speedy extermination of these two diseases. In sudden deaths in cattle one hears of the carcases being dealt with as suspected, and then owners are informed that the veterinary inspector of the local authority has certified that the disease did not exist. This, to my mind, gives owners reason to complain, on account of (*a*) unnecessary scare; (*b*) relations with insurance companies; and (*c*) loss of value of carcases, and local authorities have been put to needless expense. Where the veterinary inspector of the local authority cannot say "not anthrax" it is justifiable, but otherwise, it can be obviated by an examination on the spot or by examining a slide at home and informing the owner. I might mention here that Frohner (*loc. cit.*) gives six photos of anthrax bacilli under different conditions.

The scheduled forms of tuberculosis offer great facilities for the development of diagnostic methods; the udder case must be diagnosed by the clinical picture *plus* the finding of typical acid-alcohol-fast organisms in the milk, or by the lengthy biological test. There is room for research work upon "guinea pig" diagnosis in order to reduce the time which elapses from inoculation to *post-mortem* examination, either by using sensitised animals (more than one) or by damaging tissues to make them vulnerable, etc. The chronic cough, etc., case must be detected by clinical examination, and the finding of tubercle bacilli in the

sputum, etc. The animal with emaciation due to tuberculosis is most difficult to diagnose; the first stage is the demonstration of typical acid-alcohol-fast bacilli; then, after an examination of the lungs, one may explore the rectum for changes in the glands or for "grapes." The tuberculin test does not help very much—a positive reaction does not say that the emaciation is due to tuberculosis. There are many conditions which can and do produce emaciation in a tuberculous animal. I think the tuberculin test, so far as the Order is concerned, is little more than an insurance policy against "full value *plus* £1."

There are other aspects of diagnosis which are quite as important as many of those considered above, but I fear my remarks are already too long. We are progressing in veterinary research, but the practitioner will have to make his voice heard if the clinical side and non-microbic aspects of veterinary surgery and medicine are to receive the attention they so amply merit.

In conclusion, I should like to give an extract from a little work—Rutherford Morison's *Abdominal and Pelvic Surgery for Practitioners*—to which my attention was drawn by Prof. W. M. Mitchell, of the Royal (Dick) Veterinary College.

> "More and more is diagnosis being based upon proof—the discovery of a bacillus, hooklets, spirochætes, X-ray and other illuminations, laboratory tests, instruments of precision, etc. But for ever a great part of diagnosis will remain an art dependent upon 'clinical instinct.' This art is yet the stronghold of the practitioner because it is yet the most useful and often the only guide. Everyone admits that diagnosis may be a difficult problem in medicine or surgery. The greatest authorities are still too often made to realise their impotence when faced by anything beyond the ordinary, but a careful study of the history, a careful consideration of the symptoms, and a skilful interpretation of the physical signs will lead in the majority of cases to a correct diagnosis. The difficulties and uncertainties of diagnosis have been overrated, and this to such an extent as to discourage the practitioner in his efforts to arrive at a definite opinion."

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DISCUSSION.

As his paper had been printed and circulated, Mr. PILLERS asked to be allowed to amplify it, first stating that he wished it to be regarded not as destructive criticism but as constructive, and leading to some sort of progress. He proceeded to pass round books of reference which were mentioned in the paper, and also a number of instruments, etc., which would be found helpful in diagnostic work, such as a small pocket lens, an ordinary urine testing set, a small ophthalmoscope, three different-sized tubes for the stomach, a syringe for washing out, *post-mortem* gloves, an ordinary percussion hammer, and an endoscope for internal examination by means of illumination. One thing he wished to stress was the importance of keeping up-to-date in physiology, mentioning that in a recent issue of *The Lancet* (July 31), Professor Mallanly published a paper on pancreatic secretion, which was entirely different from what had been taught at College. As a result of observations on cases whose stomachs had been removed, and those suffering from absence of hydrochloric acid, doubts had been thrown on Bayliss and Starling's work that HCl acted on prosecretin, forming secretin and that this substance activated the pancreas. "Mallanly has shown," said the essayist, "that HCl is not concerned in the function and that prosecretin does not exist. The bile salts with secretin are carried to the pancreas and so cause the flow of pancreatic juice. Sir George Newman in his *Outline of the Practice of Preventive Medicine,* says of physiology: 'In fact the patient *is* a case of anatomy and physiology to be interpreted and treated on grounds and by means which are in essence physical, chemical and physiological' (*para.* 49). As shewing the necessity of keeping abreast of the times, one might instance the functions of vitamines and the conditions which arise when they are absent from the diet. There is now almost a science in its own sphere—devoted to the endocrine glands—in health—disease and in therapeutics—endocrinology."

He was sure members would think it was presumptious on his part if he were to enumerate the essential diagnostic instruments of the veterinarian's "tool bag," They were, however, altering. In addition to thermometers, phonendoscopes and percussion methods, there were now being added speculums, torches, ophthalmoscopes and various exploring tubes.

The practitioner should have his microscope ready for use on a suitable bench with good illumination. It was needless to say that a $\frac{1}{12}$in. oil immersion lens was essential for bacterial diagnosis. Reagents and glassware need be few and the same could be said about stains—Gram's, Ziehl-Nielsen, Leishmann and methylene blue.

A microscope under a glass bell jar on a bench invited attention; in a mahogany box under a pile of old books or on top of a cupboard it was almost diagnostic of mental

inertia. He thought veterinary societies should try and foster the study of diagnostics. Treatment would follow. Post-graduate courses for practitioners were few and far between. New works on diagnosis of human disease might be purchased and given to young members on the understanding that they reported on the subject to the Society. Instruments such as gastroscopes might be dealt with in the same way. Members interested in different techniques might be asked to instruct others. He thought that papers such as, say, " The Liver of the Ox in Health and Disease," or " The Diagnosis of Renal Disease in Horses," were much more valuable than those dealing with all the aspects of a disease in set text book form.

Mr. H. W. DAWES opened the discussion in a reasoned address. He said he was very pleased that he had been asked to undertake that task, for it enabled him to pay tribute to the thoroughness with which Mr. Pillers had prepared his paper—a result for which everyone who knew Mr. Pillers was quite prepared. The title of the paper might have been expected to lay him open to attack from all sides. " My only regret," said Mr. Dawes, " is that he has not taken up a more provocative attitude, because in reading the paper I cannot find many points upon which it is possible for us to disagree. He refers to the importance of physiology, but if I were asked what branch of science the diagnostician should know, I should say not only physiology, but also applied anatomy. If you look back on the history of the veterinary profession you will find that among the men who have made their mark, the majority had a practical knowledge of applied anatomy, and they carried that knowledge into their everyday practices. Mr. Pillers referred to the man who has a pet sign for every disease ; well, we all have heard of the veterinary surgeon who, after a box-door diagnosis, turns round to his admiring friends and tells them at once what is wrong. That day, however, is over, and what has helped to kill it is increased education on the part of owners and farmers generally. They are not satisfied with such a hurried diagnosis to-day. As to the books to which Mr. Pillers has referred, I can recommend them all, but there is one book which he has not mentioned which deserves attention, and that is *Clinical Veterinary Medicine and Surgery* (Cadiot) translated by Dollar, whilst I should also like to pay a tribute to Henry Gray's translation of Nicholas's *Veterinary Ophthalmology*. Dealing with disease of the skin, Mr. Pillers mentions the close connection between this and stasis of the alimentary canal, well shown in urticaria in the horse and dog. I have no criticism to offer on that, and I agree with him also in what he says as to the undue regard that is paid to the labial reflex. It is carried to a ridiculous degree with regard to parasitic mange, and to a large extent the labial reflex response varies in different animals. The scratch reflex in the dog, for instance, is present to an extraordinary degree in some animals. I should be glad if Mr. Pillers could give us some hints on the diagnosis of ringworm in the dog. There are certain conditions of ringworm, particularly met with in bull terriers, which are very difficult to diagnose. Another skin manifestation of value in diagnosis is emphysema, following rib injuries and punctured lungs. Mr. Pillers' references to symbiotic mange are of great interest. The amount of trouble in the heavy horse arising from symbiotic mange is very great and one meets continually with injuries and lameness arising from the irritation produced. I believe that in certain towns it is now the custom to dress the legs of all new purchases entering the stud, and here in Birmingham, as Mr. DeVine could tell us, symbiotic mange is very thoroughly dealt with, and at most of the depôts antiseptic leg baths have been introduced as a routine measure. With reference to lameness, there is no question in which a greater knowledge of applied anatomy is required, and the man who can successfully diagnose lameness must be a good anatomist. I cannot agree with all Mr. Pillers has said about the use of the stethoscope, and I fail to see how it would help us very much in the detection of lameness. Recently, Macqueen drew attention to the question of " pointing " in foot disease and mentioned that " pointing " may be limited to a very slight advancement of the lame leg, not by any means approaching the characteristic attitude formerly given as indicative of foot lameness. This slight " pointing " is of great value from a diagnostic point of view. I should also like to remind you of the characteristic attitude assumed in chronic stifle disease associated with a general tucked-up appearance. Then again, in the condition which I will term incipient pain of the flexor tendons seen in cart horses, there is an early stage in which the animal lies down as much as possible, often after a day's work, getting down before finishing feeding. When the animal is forced to rise, there is a period of acute pain for a few minutes, so noticeable that the horse keeper will inform one that the animal appears to have rheumatism. This condition is often seen before any material change occurs in the affected tendon.

As to the value of local anæsthesia in diagnosing lameness, I differ with him when he states that there are some skins which will defy the hypodermic needle. Given the right type of needle and sufficient experience there are practically no skins which will defy local anæsthesia. I have always been very sceptical of shoulder lameness, at any rate so far as it concerns commercial horses, and the more careful and thorough the diagnosis, the less often will the shoulder be involved in the condition producing lameness. With regard to an examination of the mouth, personally I think the sense of touch is very important, and with regard to diseases of the mouth, I would like to quote an extract from Cadiot :

> " When during the treatment of inflammation of sinuses and periodontal disease consequent on dental trouble the appetite fails and grave constitutional disturbance appears, one should beware of blaming it entirely to the local lesion and remember that dental affections, especially in the larger animals and when prolonged, favour obstruction of large intestine and impaction of cæcum."

It is important to notice undue spacing between the teeth, and I would also advise you to beware of the apparently innocent small growth around the cheeks or face. Frequently these may be of a malignant nature. You may remove it, but it recurs sometimes with alarming rapidity, and soon assumes malignant symptoms. I often think the best surgical proposition in these cases is non-interference. Mr. Pillers criticises, quite rightly, those practitioners who think they can gauge temperature without the use of the thermometer, but there are conditions in which it is not

advisable to place too much reliance on the thermometer. There are cases in which the thermometer may not provide much information. For example, in acute gastric trouble, sometimes you may get no rise of temperature, but even a subnormal temperature, in some cases. You may also have extensive peritoneal infections in the horse and dog when the thermometer may not record much alteration of temperature. There are few who do not use the stethoscope in the examination of the chest of the dog, and I think it is of great value. Palpation of the abdomen in cases of diseases of the stomach and intestines is of diagnostic importance, and I was glad to read Mr. Pillers' remarks on rectal examination. This should be most carefully and frequently practised, especially in cases of colic, not to mention an examination of the inguinal region for hernia in cases of colic in the entire horse. Rectal examination is also very desirable if you suspect impaction of the cæcum in a horse, but I have not yet been able to satisfy myself of its value in the case of enlarged liver. At the same time, in a case of definite kidney disease you can learn something by a rectal examination, because the kidneys of the horse are fairly accessible *per rectum*. I also appreciate a rectal examination for enlarged prostate in the dog, a condition which may be diagnosed with certainty if it is carefully undertaken. It is necessary, of course, to know the normal state, because comparison is difficult unless one knows both the normal and the abnormal. Gastritis in the dog is a much abused term in veterinary medicine, and it is used very loosely. The type of vomit is sometimes a guide. There has been a sad lack of systematic examination of the urine, and I should be glad if Mr. Pillers would enumerate one or two of the more simple tests in the case of the small animals. I think palpation of the loins for nephritis in the horse is a fallacy. Most horses show resistance and flinch and the test is of very little value. Mr. Pillers was quite right in drawing attention to our failings in regard to diseases of the nervous system, and Gray has emphasised the need for a careful diagnosis in cases of so-called nervous distemper which we often meet with in the course of practice. In the horse we do not see the amount of nervous trouble that we used to, but in connection with injuries to the brain and central nervous system I would like to remind you of the condition of Cheyne-Stokes' respiration that is sometimes of value in diagnosis.

As regards diseases of the eye, the ophthalmoscope is of value, not only in eye lesions but also in certain nervous conditions. In the diagnosis of corneal opacity the use of a 1 per cent. solution of fluorescin is of value in determining areas of the cornea devoid of their epithelial covering. There are no conditions in which a careful diagnosis is of more value than diseases of the eye and a knowledge of the normal eye and its reflexes is essential for successful treatment.

I must disagree with Mr. Pillers as to the effect of the Parasitic Mange (Amendment) Order. He thinks it ought to be revoked, but I think work is beneficial in such casea dnd helps rehovery.

In conclusion, I should like to submit that there are two things which, above all, tend to a more careful diagnosis. One is the more frequent making of a *post-mortem* examination and the other the taking of notes in regard to cases. We, as practitioners, are very busy men, and it is difficult to become enthusiastic about note-taking after a hard day's work. But if we jotted down at the time the points that struck us, we should acquire a wonderful collection of clinical material, not only for our own use later on, but for the benefit of others. We exchange our experiences verbally at meetings such as this, but we have no record of them, and the value of the information is soon lost. I do wish some definite record of our daily work was possible. Mr. Pillers is one of the first to try and place diagnosis on its proper footing, and when we read his paper a second time, as I am sure most of us will, we shall acknowledge more than ever our indebtedness to him this afternoon. (Applause.)

Mr. DEVINE said that, though he was not able to contribute to the discussion, he would like to say how much he had enjoyed Mr. Pillers' paper, and also the address they had just listened to from Mr. Howard Dawes. Systematic diagnosis was of the highest importance, especially to the general practitioner, and Mr. Pillers had put them in the way of it. Not only the Midland Division, but the profession at large, would profit by the simple truths he had presented to them.

Mr. TUDOR HUGHES said the paper and the discussion were something to which he had been looking forward, and he was glad to say he had not been disappointed. With regard to lameness, he thought one should never be put off with someone else's search of the foot. The blacksmith would sometimes say : " I have examined the foot and there is nothing the matter," and whenever he heard that he always examined the foot himself with re-doubled care. In injecting to locate lameness of the fore limb, had Mr. Pillers, in his personal practice, found the quantities mentioned in the paper preferable to a smaller amount of a higher concentrated solution ? Was there any danger of an erroneous diagnosis from sputum taken from cattle ? In the matter of radiography, the question of cost entered into the calculations of the ordinary practitioner. He would like to know, also, whether there were any new methods for the diagnosis of contagious abortion, and what was the value of the agglutination test for this purpose ?

Mr. GOOCH said the text of Mr. Pillers' paper seemed to be " Everything possible." Had not Mr. Pillers been very much helped in diagnosing cases by the look of the eye of an animal, and more especially the horse ? He (the speaker) had been so helped, and another great aid to diagnosis was what he might call the clinical instinct. You could not make a good clinician either by experience or by reading unless he had an instinct for it, and one of the things he always impressed on the young veterinary student was to study an animal in health, as well as in sickness. As to the *post-mortem* gloves which Mr. Pillers had displayed, they were of American origin, and were recommended by the Board of Agriculture twenty years ago.

Mr. WHYTE, referring to the diagnosis of roaring, mentioned a case within his knowledge in which a gipsy deceived a man into buying a horse that was a roarer by putting corks up the animal's nostrils.

Mr. STEELE BODGER endorsed the remarks of Mr. Howard Dawes as to the value of note-taking, especially of a *post-mortem*. He himself always tried to get a *post-mortem* on every animal he had treated, if it died. If they all kept notes of their cases, the profession would be much

richer and it was a point which veterinary surgeons would do well to remember.

Mr. BROOKE thought the Division should arrange for a paper on Diagnosis, at least once every two years, for nothing was of greater value to the every-day practitioner. Great care was required, and whether he was examining a dog or a horse he always tried to do it thoroughly before forming any conclusion. Mr. Dawes mentioned the lower temperature in cases of gastric trouble. He (the speaker) had found that repeatedly, and he at once directed his attention to the heart, and he generally found some nervous affection. A successful diagnosis depended on one's knowledge of physiology, whilst, as to the methods employed, there was much to be learned by an interchange of views such as they had had that day.

THE REPLY.

Mr. PILLERS, in reply, said he must first thank Mr. Howard Dawes for the very kind and able manner in which he had opened the discussion. He agreed with all that he had said on the importance of anatomy, but why he did not emphasise that was because they got a good instruction at school in anatomy, but not in physiology. With regard to the test for labial reflex in the horse, he might have described the real military way of doing it—only a major, who must be wearing a glove, could do it, and armed with a piece of stick which was shaved between uses ; but those who had any experience in France would know all about it. He had been asked if he could help in the diagnosis of ringworm in the dog. It was often a difficult point, and he had examined many ringworm cases with the ordinary caustic potash method. It was quite satisfactory for cattle, but it was not so for the dog. One had to use staining methods and even some of these were not definite. He could not say that was any " patent " way, without taking a great deal of trouble with staining. With regard to the application of the stethoscope to the joint, which Mr. Dawes had criticised, he (the speaker) did not attach much importance to it, but if one had a joint case and by its use one could hear a " snap " which one would not otherwise have heard, it told one something. On the question of incipient strain, he thought Mr. Dawes had struck one of the most important group of diseases to which town heavy horses were liable. He thought the best way was to regard the group of diseases included in that term as " a thickened tendon" syndrome. In this there were many quite distinct clinical conditions. The rheumatoid tendon, as described by Mr. Dawes, was one, acute sprain another, peri-tendo-vaginitis a third—thickening following picked up nail or rest, a fourth—and so on ; when one located the trouble in the tendons the diagnosis was about to begin. With regard to urine tests, the test for albumen was a simple one. In the dog, said Mr. Dawes, albuminous urine might not be of such importance as in the human subject, with which he agreed. Centrifuging was the aid by which cells, casts, etc., were collected. As to the ophthalmoscope, he would not deny that an electric one was best, but as a believer in evolution he had shown the ordinary one, hoping that, if everyone would use it, the electric one would come later on. With regard to the method of taking blood pressure, he suggested that Mr. Dawes should write to Horning and McKee for information on the subject. He had himself consulted writers abroad and had found them most kind and helpful. As to the Parasitic Mange (Amendment) Order, he believed the danger of its application lay in the difficulty which some people seemed to experience in distinguishing between sarcoptic and psoroptic scabies and therefore called them all psoroptic and thus worked sarcoptic cases. Answering Mr. Tudor Hughes, Mr. Pillers said that in his local anæsthetic injections he used a smaller quantity of fluid than was recommended by Cadiot and Almy, and of higher concentration. With regard to washing out dogs, the great thing was to do it in suitable cases. A point made by writers in America was that it was often over-done, and it was then likely to prove injurious. He did not want to enter into the question as to whether they should so such work as necessitated such methods as the use of antiformins themselves or send it to an institution. What was wanted was information when one was not sure of a point. If it was possible to do it oneself so much the better. Perhaps the rich man could pay to have it done. It was especially valuable in cases of tuberculosis of the udder that the clinician should do the microscopic work. With regard to the sputum test in cattle, he had not seen a single error up to the present. Control of the eye for ophthalmoscopic examination was like other forms of handling animals. A horse would not be steady, so one held his halter, then he moved and one twitched him, then he shut his eye and one used a speculum. Under chloroform he might roll the ball. One then realised that the best thing was to have the animal in a quiet box and do the job with a little patience. One would find it was not necessary to do anything, in a very large number of cases, to dilate the pupil. If one did the vision might be upset. With regard to radiography, if one employed a medical man he would charge one a considerable fee. As for buying instruments abroad in the expectation of getting them cheap on account of the rate of exchange, it was not so easy as it seemed, as the Continental dealer had his own ideas on the foreign value of his own currency.

Mr. Pillers briefly referred to Dr. Hill's (M.O.H. for Durham) remarks in the *Veterinary Record*, for July 31st, 1926, page 671. The doctor, in discussing Circular 13 of the Ministry of Agriculture and Fisheries, made some generalisations on the diagnosis of tuberculosis from sputum and milk, which, if accepted, put the clock back about twenty-five years. Dr. Hill had invoked the assistance of Professor Hutchins and Dr. Savage. Reports were not always the exact words of the speaker and he did not know exactly the questions put to Dr. Hill's correspondents, but it could be stated definitely that at the hands of a careful veterinary clinician the demonstration of acid-alcohol-fast bacilli indistinguishable from tubercle bacilli in properly taken samples of milk and sputum, was a very reliable means of diagnosis of tuberculosis of the udder or of the respiratory tract. Torrance's contributions with regard to special samples of milk had proved this in the case of the udder. Gofton had stated the same principle and it was the experience of others. This subject alone was almost worthy of a paper.

After answering other comments, Mr. Pillers concluded with the hope that his paper had been of interest to those who were keen upon being as exact as possible.

The Influence of the Administration of Certain Salts on the Yield and Composition of Milk.*

By A. T. R. Mattick and N. C. Wright.
From the National Institute for Research in Dairying, University College, Reading.

Introduction.

It is a well-established fact that the calcium concentration of blood remains at a very constant level, and that no measurable effects are produced by feeding rations with abnormally high contents of calcium. Recently Stewart and Haldane (1924) have claimed that the calcium content of human blood serum can be altered, within limits, by the oral ingestion of large quantities of certain salts. The objects of the experiments recorded below were to ascertain whether similar alterations could be effected in the calcium content of the blood plasma of lactating cows, and to discover what alterations, if any, were induced in the composition of the milk by this means.

The animal selected for the experiments was a white Shorthorn heifer; she weighed approximately 500 kilograms, and at the commencement of the experiments was in her fifteenth week of lactation, yielding 13 lbs. of milk per day.

Each experimental period was of about one week's duration, the animal being given sufficient time between the experiments to allow of recovery to normal.

The salts used were: (1) for raising the plasma calcium content, calcium chloride and ammonium chloride; (2) for lowering the plasma calcium content, sodium bicarbonate and disodium hydrogen phosphate (Na_2HPO_4). The salts were given in solution as "drenches," the doses being spread over a period of six hours (10 a.m. to 4 p.m.).

During the experimental periods, the cow remained on a normal daily ration, which consisted of 3½ lbs. seeds hay, 30 lbs. silage, 20 lbs. marrow stem kale, 50 lbs. mangels, and 2½ lbs. concentrates. This ration contains approximately 4 ozs. of CaO and 3 ozs. of P_2O_5.

For convenience we have divided the results into two sections, the first showing the effect of the various salts on the calcium content of the blood plasma, and the second, their influence on the composition of the milk.

Calcium Content of Blood Plasma.

The method of analysis employed has been published elsewhere (Little and Wright, 1925).

A summary of the results obtained is shown in Table I, and in Table II these results are compared with those obtained by Stewart and Haldane on a human subject.

Table I. *Alteration in the Calcium Content of Cow's Blood Plasma.*

Weight of cow, 500 kilograms.

Normal calcium content of plasma, 9·8 mg. per 100 g.

Experiment*		Blood sample taken	mg. Ca per 100 g. plasma
Day 1. $CaCl_2$	6 oz.	Next morning	9·6
Day 2. ,,	12 oz.	,,	10·1
Day 1. NH_4Cl	8 oz.	—	—
Day 2. ,,	16 oz.	6.0 p.m. same day	7·35
		Next morning	8·4
Day 1. $NaHCO_3$	6 oz.	Next morning	9·8
Day 2. ,,	12 oz.	—	—
Day 3. ,,	24 oz.	5.0 p.m. same day	9·8
Day 1. Na_2HPO_4	32 oz.	8.0 p.m. same day	9·0

* All doses given between 10.0 a.m. and 4.0 p.m.

* From the *Biochemical Journal*, Vol. XIX, No. 6, 1925.

Table II. *Comparison of Results.*

Salt	Dose (g. per kg. body-weight) Human	Cow	Percentage rise or fall Human	Cow
$CaCl_2$	0·30	0·36	+25	−2
	—	0·72	—	+3
NH_4Cl	0·25	0·48	+10	—
	—	0·96	—	−24
$NaHCO_3$	0·60	0·36	−20	±0
	—	0·72	—	—
	—	1·44	—	±0
Na_2HPO_4*	0·60	1·90	−20	−8

* Private communication from Dr. J. B. S. Haldane.

It will be seen that none of the results is in agreement with those recorded by these two workers. The results are the more striking since, in our experiments, doses were given which were proportionately and actually far in excess of those quoted by them as adequate to produce marked alterations in the serum calcium content.

At present it is impossible to explain this discrepancy. The results obtained by us can hardly be attributed to analytical errors, for very great care was taken to guard against these: the quantities of plasma at our disposal (varying from 15 to 25 g.), and the good agreement of duplicate determinations were alone sufficient to preclude the possibility of errors of such magnitude. From this point of view the use of a cow as an experimental animal was of considerable advantage.

Further, the more complete results shown in Fig. 1 demonstrate the very consistent results obtained throughout each experimental period.

It appears possible that the different morphology of the alimentary tract of the cow and the different nature of the diet may be responsible for these contradictory results, though such an explanation cannot account for the action of the ammonium chloride. It is also possible that the cow has developed a more efficient mechanism for controlling the level of calcium in the blood, since she is liable to continual loss of large quantities of calcium in the milk. In any event, our work demonstrates that the calcium content of the blood plasma of a lactating cow cannot very easily be altered. This result is contrary to those obtained by Stewart and Haldane for the human subject.

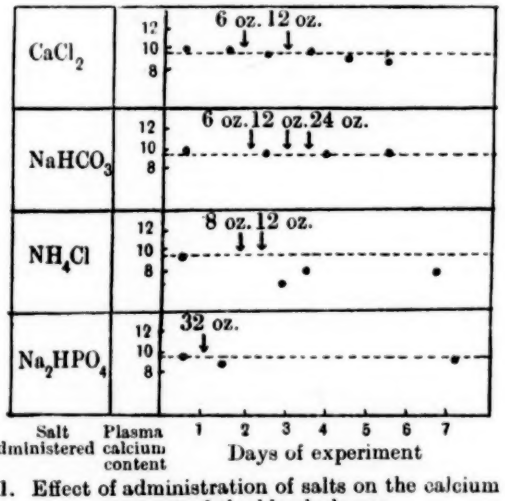

Fig. 1. Effect of administration of salts on the calcium content of the blood plasma.
(Dotted line represents normal value)

Yield and Composition of Milk.

In three of the four experimental periods (dosage with calcium chloride, sodium bicarbonate, and disodium hydrogen phosphate) there were no significant alterations either in the yield of milk or in those constituents of the milk which were estimated, *i.e.*, fat, total protein, caseinogen, lactose, ash and calcium (illustrative fig. is given by the authors). With regard to other inorganic constituents, we have no direct evidence. Measurements have been made of the time of coagulation of milk with rennet, a reaction which we should expect to be a delicate measure of alterations in the "salt balance" in milk. In no cases were there any significant alterations in renneting time. There were also no alterations in reaction, as judged by colorimetric tests with the bromocresol purple indicator.

In the third period (dosage with ammonium chloride) the changes were profound. The following are the notes recorded during this experimental period.

"The first day was kept as a control, and no dose given.

"No adverse effects were observed after ingestion of 8 ozs. on the second day (March 17th, 1925).

"On the third day (March 18th) doses were given as follows: at 10 a.m. 6 ozs., at 12 noon 6 ozs., at 2 p.m. 4 ozs. At 3 p.m. the cow showed signs of discomfort. She refused food, was breathing rapidly, and would not rise. At 5-30 p.m. she was still unable to rise and was obviously distressed. At 7.30 she had risen but was not comfortable: there was profuse urination. The milk yield was reduced from 4 lbs. to less that ½ lb. The following morning (March 19th) she was up, but off her feed; her eyes were glazed, but sight appeared normal: the milk yield was almost entirely suppressed. The following day (March 20th) she appeared easier; breathing was normal: the eyes appeared weak, and the left eyelid was swollen. The milk yield was increased. From this time there was a gradual recovery both in condition and in milk yield."

On the third day, after ingestion of the large dose (16 ozs.) of ammonium chloride, the milk yield fell to a fraction of the normal figure. The composition of the milk, however, remained normal, except for the fat, which was slightly low. During the next five milkings, the yield remained low (varying from ½ to 1¾ lbs.), but the composition was entirely altered. The fat, protein and ash rose to a maximum at the time of the fourth milking (in which the fat reached 17 per cent. and the protein 7·5 per cent.), but subsequently returned to normal as the milk yield increased. The lactose, on the other hand, fell to a minimum at the third milking, and then slowly returned to a normal value.

The explanation of these facts is not clear, but the following suggestions are put forward to account for the observed results. The immediate consequence of the heavy dosage was a complete disorganisation of normal metabolism, which resulted in a partial suppression of milk yield, but which caused no alteration in the composition of the small quantity which was secreted. In the two following days, although the quantity of milk secreted had increased, the ammonium chloride exerted its influence as a dehydrating agent (Haldane, Hill and Luck, 1923), and caused by the removal of water a concentration of the constituents of the milk. The lactose, which is easily diffusible, was reabsorbed into the blood stream, and actually appeared in the milk in lower concentration than normal.

The whole experiment indicates, however, that the methods employed are useless for the purpose for which this part of the work was undertaken, *i.e.*, the correlation of the calcium content of blood and milk.

In the first three periods of the experiment (dosage with $CaCl_2$, $NaHCO_3$ and Na_2HPO_4), although very considerable quantities were given, the results proved negative: in the fourth period (dosage with NH_4Cl) the interference with normal metobolism was so great as to cause suppression of milk yield and gross alterations in composition, with consequent vitiation of results.

Summary.

Attempts have been made to alter the calcium content of the blood plasma of a cow by means of large oral doses of certain salts, and the effect of these salts on the composition of the milk has been studied.

The results indicate (*a*) that it is extremely difficult to alter the plasma calcium content by these means, and (*b*) that it is impossible by such means to effect any alteration in the composition of the milk.

With ammonium chloride (16 ozs.) the severe disturbance of normal metabolism, and the dehydrating action of the salt, caused an almost complete suppression of milk yield, accompanied in its later stages by a temporary increase in the concentration of the constituents of the milk.

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Haldane, Hill and Luck (1923). *J. Physiol.* 57, 305.
Little and Wright (1925). *Brit. J. Exp. Path.* 6, 129.
Stewart and Haldane (1924). *Biochem. J.* 18, 855.

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Rats, Worms and Cancer.

While the London Zoo exhibits a number of strange animals from abroad, none are more strange than the large unseen fauna which has received the attention of so many distinguished parasitologists in the past. In describing the helminths found in the Zoo rats, at a meeting of the Zoological Society on June 1st, Professor R. T. Leiper, F.R.S., drew attention to the occurrence of *Gongylonema neoplasticum* in these animals. This was the first occasion, he pointed out, that this most interesting form had been found in Great Britain. Fibiger studied material which had reached Denmark from the West Indies and South America—where it is enzoötic—and doubtless the infection had originally reached the Gardens from the same region; although it is now established there, there is no reason to suppose that it is found elsewhere in Britain, or, indeed, at all generally in Europe. The parasite had for a time a somewhat sinister reputation, as Fibiger had shown that cancer was sometimes caused by its presence; it was at one time utilised to reproduce the disease in the laboratory, but has since been replaced by tar painting as a more convenient cause of experimental cancer. A few years ago it was claimed that there was a peculiarly irregular topographical distribution of gastric cancer, and that a group of these cases was associated with definite streets in certain villages in Italy. The hypothesis was advanced that there was some correlation between gastric cancer in man and gastric cancer in rats—the double assumption that *Gongylonema* occurred in the rat and man in these regions was utilised to explain the old "cancer-house" theory, which thus received a new lease of life. Professor Leiper pointed out that recent investigations in Italy failed to substantiate either assumption, although it had been shown that an allied species of *Gongylonema* was very prevalent in sheep, cattle and pigs in these regions. The incidence of these parasites, however, could in no way explain or be correlated with the cancer-house theory. Moreover, this allied species—unlike the *Gongylonema* in the rat—never produces cancer in its definitive hosts; and in the few case in which this species has been found in man there is no evidence that cancer resulted. Only on the assumption that *Gongylonema* in the rat was the same species as that in the farm animals could the association of vermin in "cancer-houses" with cancer cases in man be explained. The material obtained from the Zoo was utilised to clear up this point, and it was shown conclusively that when sheep were experimentally infected with cockroaches, previously infected with the *Gongylonema* of the rat, the resulting worms differed morphologically from the species naturally found in sheep, and were identical with the species of the rat. It is clear, therefore, that the widespread distribution of *Gongylonema scutatum* of sheep and cattle in the neighbourhood of cancer villages gives no ground for the assumption that the rat harbours *Gongylonema neoplasticum* or that it transits it to man. This experimental work illustrates also the danger of assuming that, because an animal can be infected with a parasite experimentally, it is a carrier of such a species in nature.—*British Medical Journal*, June 12th, 1926; p. 1002.

Milk From the Cow's Point of View.

At a recent meeting of sanitary inspectors (North Wales Centre) held at the Guild Hall, Carnarvon, an address was delivered by Mr. L. W. Wynn Lloyd, F.R.C.V.S., chairman of the Carnarvon Sanitary Committee, on the subject, "Milk from the cow's point of view."

In the course of his address, Mr. Wynn Lloyd said:—

"Cow's milk must be regarded, to some extent, as an artificial food, as far as man is concerned. Its original purpose was, obviously, to nourish the calf, and it was never intended to see the light of day. It is a very complex fluid, and requires the greatest care in collection and distribution from the pail to the palate. Moreover, it is a most favourable medium for the growth and propagation of any specific organisms which may gain entrance, and once such contamination has occurred, milk becomes a veritable poison.

"The public demands, and should have, clean milk. Official oversight of anything which comes into intimate touch with all the people cannot proceed far in advance of public sentiment. Accordingly, attention must be given to the public mind regarding milk and the possibility of so directing milk improvement as to increase intelligent interest in the subject. Progress is the logical result of the best elements in the situation working together. The tendency of the press to announce milk crusades shows suspicion on the part of the milkman that the health officials are not fair-minded, and a feeling on the part of the consumers that the milk is hopelessly bad, are usually all to be met and overcome.

"If the more intelligent members of the community are asked to express in non-technical language their ideas regarding the characteristics of a good milk supply, they will insist that it be such that they can use it without danger of disease, that it be fairly rich in cream, that it carries nothing offensive to the æsthetic sense, and that it remain sweet for a reasonable time after delivery. In short, the consuming public desires a milk which is safe, rich, clean and sweet.

"Any system of control which they understand is striving to provide them with such an article tends to enlist their support. The safety of the milk supply can be guaranteed either by the supervision of the health of the cows and people concerned in its production or by treatment of the milk itself. There is a natural and widespread feeling that it is better to protect milk from infection than to free it from infection.

"Experience with 'certified' milk production has shown that a careful periodic examination of the cows and people, supplemented by constant oversight, will reduce the danger of contamination to low limits. On the other hand, the expense incident to such a careful frequent examination and oversight is so great that no community has yet provided adequate funds, for such supervision entails an economic burden.

"Apart from the health of the cow, what is the minimum which we should insist upon? We should regulate the milker. He, at least, should be above suspicion, both in general health and cleanliness. An ample supply of water and facilities for washing must form part of every dairy equipment. Soap and nail brushes are essentials, and supervision to insist on their use. Special clothing should also be worn during milking.

"Sterilised milk vessels are, of course, assumed. Cleanliness of the udder and teats come next in importance. Unless these are particularly filthy, it will suffice and indeed be more suitable in practice to wipe them with a dry cloth.

"Given the conditions which I have enumerated, we should hear very little of milk epidemics and we as sanitarians could recommend milk as a food with that confidence which we have so much longed for."

The Veterinary Record.

2nd October, 1926.

EVERYTHING POSSIBLE—FOR PROGRESS.

This was the keynote of the admirable paper entitled "Some Aspects of Diagnosis," presented by Mr. Noel Pillers to the Midland Counties Division in Birmingham.

The Author's love of thoroughness and his passion for detail, have, as was to be expected, produced a paper full of sound common-sense and good advice, and one which is a very helpful survey.

Mr. Howard Dawes opened the discussion in a very careful and able manner, shewing that he had devoted a great deal of thought and time to a study of the subject.

In the realm of science to stand still is to retreat, therefore one must go forward continually. To progress as a profession, we must advance as individuals. A veterinary surgeon who does not keep abreast with the knowledge of the day, is injuring not himself, but his profession as a whole and his clients also.

Gone are the days of the lightning diagnostician, the box door authority, the "vet" (that odious term scorned by every progressive veterinarian) who could diagnose the limb and seat of lameness of a horse being trotted up outside.

Mr. Pillers urged that everything possible should be done to ensure an accurate diagnosis which is the first principle of treatment. He stressed the need for a sound knowledge of physiology, and Mr. Dawes emphasised the importance of applied anatomy—these are the essentials of diagnosis.

The modern aids to diagnosis are many, and it behoves each of us to familiarise ourselves with them, and make ourselves proficient in their use. It is unfortunate that few, if any, facilities are given to the students at college to understand the use of many of these modern appliances.

For the advancement of the profession, and in order often to arrive at an accurate diagnosis, it is essential that we should have closer co-operation between the practitioner and the research worker. Through lack of this, interesting material is consigned to the dust-bin, and much fruitful knowledge is thereby lost to the profession.

Careful and accurate note taking and the recording of interesting cases are certain means of increasing the knowledge of our profession. Criticism aids progress, but we would urge that this should be of an anabolic and not of a catabolic nature.

Mr. Pillers speaks with authority, and to all our members, young and old, we would recommend that they read, mark, learn, and inwardly digest his excellent paper.

CLINICAL AND CASE REPORTS.

Myrica Gale—Is it a Poisonous Plant?

By WALTER SCOTT, M.R.C.V.S., Kendal.

The following notes are sent because, up to the present, I can find nothing in the literature of toxicology to account for the deaths of the two animals concerned.

HISTORY. In the early part of this summer several Shorthorn heifers, from one year to a year and a half old, were grazed on a low-lying, marshy pasture, and for some time the owner had noticed that these animals were not thriving, but this did not cause him any undue anxiety.

One animal, a yearling heifer, was noticed to be worse than the others; the owner therefore gave it some linseed oil. No improvement was seen, and the animal was brought inside, but became rapidly worse.

Case No. 1. *Symptoms.* When first seen, the animal was very dull and listless, the coat was "staring," and the eyes were sunk in the head. The animal lay in a corner of the box and refused to move.

Rumination was suspended, and all food was refused, but the animal would drink water greedily.

The temperature was normal. The pulse was increased in frequency and very weak. Respiration was laboured. There was a greenish, frothy discharge from both nostrils and, on opening the mouth, there was a very pronounced ammoniacal (?) smell. (This was also very evident in No. 2.) There was profuse diarrhœa, dark green in colour, frothy, and very offensive. This animal died within three days of being noticed ill by the owner.

Case No. 2. A Shorthorn heifer, 18 months old. This animal was seen to be ill a few days after the first died, and was immediately brought off the pasture. Similar symptoms were shown, except that the diarrhœa did not set in until just before death. This animal lived for six days after being removed from the pasture.

TREATMENT. Treatment was symptomatic. No. 1 died the morning after it was seen. In No. 2 the owner administered 1½ pints linseed oil. Small doses of

ammon. carb. were given repeatedly, and whisky and milk were given at frequent intervals.

The stomach tube was passed on the third and fifth days, and a bucketful of fluid drawn off each time, and half a bucket of saline solution pumped into the stomach. The peculiar ammoniacal (?) smell noticed in No. 1 was even more pronounced when the stomach contents were drawn off. This animal rapidly weakened, and died on the sixth day.

AUTOPSY. No *post-mortem* examination was made on No. 1.

No. 2. The contents of the "stomachs" were in a very fluid condition, and present in all four "stomachs" were innumerable small pieces of wood, varying in size from half an inch to an inch-and-a-half in length, dark brown in colour, and very hard. Apart from these pieces of wood there was no solid food in the "stomachs." In the abomasum there were several acutely-inflamed patches, and the inflammation had spread for a considerable distance into the bowel. The bowel contents were fluid, greenish in colour, and the smell mentioned above was again present. The liver showed no sign of fluke, and the other organs of the body appeared normal.

REMARKS. The pasture was carefully examined, and the only likely cause of death appeared to be a small shrub which was growing in abundance on the land, and which showed signs of having been extensively browsed by the cattle.

I sent a specimen to Professor Greig, of the Royal (Dick) Veterinary College, Edinburgh, and he identified the plant as Myrica Gale, Natural Order, Myricaceæ. "The only British species of the order (*i.e.*, Myricaceæ) is M. Gale, Bog Myrtle, or Sweet Gale, a low shrub about three feet high, which has a sweet resinous smell when bruised. Leaves ovate-lanceolate, toothed towards the upper end. Found in bogs in Scotland and in the North of England, and occasionally in the south."—(John's *Flowers of the Fields.*)

I have consulted Long's *Plants Poisonous to Live Stock*, and Lander's *Toxicology*, and can find no mention of this plant in either of these works.

The part of the pasture where the plant was growing has now been fenced off, and since then there have been no similar cases among the remaining cattle, and these are all in a healthy condition.

Two Cases of Milk Fever in Dairy Cows before Calving.

By ARTHUR NEW, M.R.C.V.S.,
Ashton-under-Lyne.

On July 25th I was called to attend a cow that was due to calve. I found her staggering round the loose box, champing the jaws, frothing at the mouth, with staring eyes, and generally showing the symptoms of milk fever. Examination *per vaginam* showed the os closed. The temperature was normal. I had the milk drawn and udder inflated and treated this as a milk fever case. The cow was conscious and doing well next day, and she calved three days later without incident.

On August 8th I was called to a shorthorn cow due to calve, but down and unable to rise. I found her completely comatose, with deep, heavy breathing, and the body surface cold. Examination *per vaginam* found the os slightly open. Inflation and general treatment for milk fever were adopted, and the cow was up and doing well next morning. She calved normally the same night.

Uterine Torsion in a Cat.

By A. C. FRASER, Final Year Student, School of Veterinary Science, Liverpool University.

The following is the report of a case brought to the surgery of James H. White, Esq., M.R.C.V.S., during the second week of August.

The animal was a yellow and white cat, two years old, of medium size, and about seven weeks pregnant. She had previously borne one kitten.

The history was that three days before she had jumped down four feet from a dresser and cried for several minutes as if in great pain. She then retreated to her bed in a cupboard and refused to move or to take any food, only drinking a little water. On the third day the cat vomited several times.

When examined, there appeared to be no pain on pressure being applied to the abdomen. The temperature was 103·6°. The animal was very thin and was said to have lost flesh rapidly since the accident. She was destroyed.

Post-mortem examination revealed an apparently normal condition of all the organs except the uterus. The left horn of the uterus contained two fœtuses and was twisted on itself through three complete circles (1,080°), forming a spiral "stalk" at its junction with the right horn. The left horn occupied its normal position in the abdominal cavity, and contained a large amount of extravasated blood in clots, the external vessel being enormously engorged and the fœtuses putrid, stinking and dark red in colour. The right horn of the uterus also contained two fœtuses, which appeared normal.

There were no ligamentous bands around the uterus except at the "stalk" previously mentioned and the horn was untwisted with ease.

"Some of my cows are bad-tempered," said an Ilfracombe milk producer, when summoned on account of a deficiency of fat in his milk.

He added that bad-tempered cows held back their milk, with the result that fat which came at the end of milking was lost. The magistrates dismissed the case.

ABSTRACTS.

["**The Cause and Treatment of Milk Fever,**" by E. WIDMARK. *Berl. Tier. Wochens.* Vol. 32. No. 33. 13th August, 1926. p. 537.]

The author has come to the conclusion that the cause of milk fever is a deficiency of glucose in the blood owing to the sudden onset of milk secretion immediately after calving. The symptoms of insulin poisoning are identical with those of milk fever, and can be produced by injections of insulin. The glucose content of the blood is reduced and a state of coma is the result. Since glucose is the parent substance of lactose, and milk secretion uses up large quantities of glucose, the available supply is sometimes reduced to as little as 0·040%. Symptoms of hypoglycæmia often occur when the glucose value is 0·035—0·037%, as has been seen during the course of work done on insulin. Lactose cannot replace glucose or relieve symptoms caused by a deficiency of glucose. The difficulty of making a separate estimate of the glucose in blood sugar has yet to be overcome.

The glucose deficiency explanation of the cause of milk fever is easily reconcilable with the success which follows the insufflation method of treating it. The resultant diminution of milk secretion lessens the strain thrown on the mechanism which supplies blood sugar, and, as the production of glucose continues for some time after milk secretion has ceased, the normal balance is gradually restored.

The great development of the udder in a heavy milking cow has not been accompanied by a similar development of the glucose-producing organs. Milk fever is, therefore, to be regarded as the result of excessive breeding.

D. K.

["**Trifoliosis,**" by C. A. NELSON, Brainerd, Minn. *Journal A. V.M. A.* June, 1926.]

The author abstracts from *Tidskrift Svensk Veterinar* certain experiments by Hausmann and Gluck on the administration to animals of certain fluorescent colouring material rendering them sensitive to light. The injection into white mice of such a photobiological sensitizer as hæmatoporphyrin caused no effect so long as exposure to light was not given, but, according as such was introduced, symptoms increased in severity correspondingly to the intensity of the exposure. If, on commencement of symptoms, the animals were again shielded from rays of light, they recovered. Analogous results were got by feeding to white rabbits and exposure thereafter to Finsen light, the colouring matter remaining after evaporation of an alcoholic extract of buckwheat. It is known that when stock are exposed to direct sunlight too soon after feeding on buckwheat they not infrequently develop symptoms of excitement and run around performing strange motions. Only non-pigmented and parti-coloured animals are susceptible, when those parts of the skin which are unpigmented show erysipelatous inflammation, particularly that over the ear muscles, with vesication and crust formation. This may occur as long as four weeks after feeding with *Fagopyrium esculentum* ceases, hence the name Fagopyrism given the affection. Should the white markings be covered with mud, a measure of protection is afforded. The Swedish writers describe similar cases due to clover feeding. Nelson states he has for a number of years experienced trifoliosis, or clover sickness, amongst horses with white markings. Redness similar to sunburn first occurred, then exudation and scab formation. He observed the condition on the white skin of Friesian calves. In a white and roan cow he noticed stamping of the feet, as if the animal were colicked—lying down and rising at frequent intervals, salivation and fever. The white parts of the skin, especially those on the extremities, were swollen, red, painful and exuding. Vesicles were present in the mouth. The redness darkened and seemed to involve the hair follicles, giving an appearance to the animal as if she had been in a fire. After several weeks the crusts which formed fell away, to leave scars in places.

W. J. L.

[**Pyocyaneus Bacillosis and Mastitis due to Ps. Æruginosa.** By PICKENS, WELSH and POELMA. *Cornell Veterinarian.* Vol. XVI. No. 3. July, 1926.]

Pseudomonas æruginosa and *Bacillus pyocyaneus* are synonymous terms for the organism of blue green pus which has generally been regarded as a saprophyte. It has been found on the skin, in fæces, water, the genital tracts of cattle, and in purulent discharges. When found mixed with streptococci, its share as an etiologic factor is problematic, but the authors quote references where the organism has been found in pure culture in a middle ear abscess, present in the blood stream during life in fatal generalised conditions, as the sole suspected causative agent in endocarditis and pneumonia, constant in the intestinal discharge of patients exhibiting dysentery-like symptoms, as well as in water partaken by these individuals.

In the lower animals references are mentioned of *Ps. æruginosa* having been found in infectious broncho-pneumonia of the horse; pneumonia, enteritis and meningitis in the pig, and spontaneous infection in the dog. Subcutaneous injection in the rabbit caused diarrhœa, albuminuria and fever, with cachexia and paralysis of the hind quarters in chronic cases. Autopsy showed congestion of the intestinal mucous membrane generally, and small hæmorrhages in the various viscera usually. Injected into the teat canal of cattle, a mild form of mastitis was produced.

The authors received a sample of milk which the owner stated was drawn from a cow with udder trouble. From this was got a culture corresponding to that of *Ps. æruginosa.* Autogenous vaccination seemed to cause clearing of the affected quarter with return of normal milk. Four weeks later, a six-months-old dead calf from the same farm was sent in, emaciated, and having suffered from diarrhœa for about one

month. *Post-mortem* revealed severe inflammation of the intestine and degeneration of liver and spleen. Heart blood, liver, and spleen gave *B. pyocyaneus*, which was fatal to rabbits and guinea-pigs. This organism was recovered in each case, *post-mortem* showing inflammation of intestine, spleen and liver. Six months later the cow above referred to again developed mastitis, when all four quarters were affected. *B. pyocyaneus* was again obtained in almost pure culture, and vaccination was again resorted to, but apparent recovery was slower than on the previous occasion. Infection of a calf was not obtained by subcutaneous injection of 2 c.c. normal saline suspension ½ agar growth of culture (under artificial culture for about four weeks). Two guinea-pigs fed with the organism showed no ill effects.

Six months later udder trouble again appeared, the symptoms being that only one quarter was usually attacked 8 or 10 hours after milking by machine. Udders showed marked swelling, but were not unduly sensitive. Fever was only noticed in one case. During the acute stage milk greatly diminished, but usually returned to normal appearance in three or four days, irrespective of treatment, and appetite was rarely in abeyance. Recurrence often occurred in the same quarters, the secretion varying from apparently normal to stringy, thick, viscid, yellowish material, with increased numbers of leucocytes. A visit to the farm subsequently revealed information that one cow suffered from five attacks within eight weeks. Bloods from seven cows were taken and, in three individual udder secretions examined, *B. pyocyaneus* was demonstrable. All these seven bloods completely agglutinated this organism; seven in dilutions up to 1 in 200; six up to 1 in 500; and five in 1 in 1,000. Normal blood failed above 1 in 50. The water supply was by pump from a 45ft. well to a gravity tank in a barn loft. The tank had not been cleaned out for years, and yielded cultures of *B. pyocyaneus*. Taking as antigen a strain of *Ps. æruginosa* from another laboratory, no agglutinins were found present in dilutions of serum above 1 in 50 in bloods from 69 cows known not to be suffering from mastitis at the time.

W. J. L.

Pedigree Pigs for Lithuania.

The National Pig Breeders' Association report that twenty-four boars and sows of the Large White breed have been purchased by representatives of the Lithuanian Agricultural Co-operative Society for the purpose of improving the type and quality of bacon pigs in Lithuania. Several individual animals realised over £100 each, the greatest attention being given by the selectors to length of side and quality. The animals left London recently, and were accompanied by an attendant chosen from one of the leading herds in this country. Signs are not wanting that the demand for high-class breeding pigs for export will grow to unprecedented dimensions when the country is quite free from foot-and-mouth disease. Continental countries, including Russia, are showing increasing interest in the production of bacon.

REPORTS.

Report of the Imperial Institute of Veterinary Research, Muktesar, for the year ending 31st March, 1925.

With so complete and comprehensive a report, it is quite impossible in a simple review to do justice to the volume of the work which the report covers, the conscientiousness and ability with which it has been carried out, and the erudite manner in which facts and conclusions have been presented to the public. Perhaps in no country in the world is there greater scope for the veterinary scientist than in India. It is the natural home of many of the dire animal diseases which in their history have been shown to have travelled from East to West, and opportunity for research, elucidation and combat is unrivalled. With so many issues before the Director of the Institute, it is not surprising that there has been a little delay in publishing the report. In the first place, it is interesting to note the change in designation from "Imperial Bacteriological Laboratory" to the title named in the heading, which more clearly defines the profession to which it belongs, and more correctly agrees with the purposes for which it was established in 1890, *viz.*, to investigate diseases of domesticated animals, and by biological research to ascertain the means for preventing and curing the same. In practice, its chief or most apparent function has come to be the manufacture of sera and vaccines for the prevention and control of the serious epizootics in India, necessity for this being chiefly induced on the score of rinderpest, so prevalent in the country and which, Captain Edwards very logically explains on biological grounds, shows a triennial recrudescence. The institution has, therefore a most important economic function, paying for its existence by its own manufactures, an indispensable factor in a country where financial stringency is acute, and plainly indicating by statistical record the enormous saving which accrues to the agricultural community of India in the preservation of their live-stock—a situation which is still susceptible of vast economic development. A few figures taken from the statistics will make this abundantly clear:—

I.—THE INSTITUTE.

Year.	Income.	Expenditure.	Remarks.
	Rs. A. P.	Rs. A. P.	
1924–25	666,927 0 5	730,412 10 2	2,848,110 doses of anti-rinderpest serum issued.
			Stock in hand: 2,063,331 doses, including stocks ready for issue, others of varying potency for mixing, and special brews, all representing profit.

II.—THE FIELD.

Products issued.	Number of outbreaks in which inoculation was undertaken.	Number of Animals which died uninoculated in course of disease.			Number of Animals inoculated.			Number of Animals which died after inoculation.			Percentage of deaths in inoculated bovines.
		Equines.	Bovines.	Others.	Equines.	Bovines.	Others.	Equines.	Bovines.	Others.	
Rinderpest Serum ...	5,281	—	69,064	51	—	707,345	803	—	2,408	—	0·34
Anthrax Serum	360	8	1,710	122	282	98,643	821	—	49	2	0·05
Hæm. Sept. Serum ...	1,175	—	10,757	26	6	198,107	52	—	84	—	0·04
Hæm. Sept. Vaccine ...	613	—	40	—	—	164,473	—	—	9	—	0·005
Blackquarter Vaccine Serum, Germ-free filtrate and aggressin	286	—	686	—	—	26,332	—	—	53	—	0·201

Note the enormous reduction in mortality under inoculation.

Two new features in the working economy of the Institute were initiated during the year.

(1) The greater part of the routine serum production was transferred to the plains at Izatnagar, near Bareilly, crude stocks manufactured there being sent to Muktesar for cool storage standardisation, by test on animals and issue for field use. A more general use of buffaloes (plains buffaloes at Izatnagar) as serum producers is being made, these animals being used an appropriate time successively for anti-rinderpest serum, hæmorrhagic septicæmia serum and possibly for anti-anthrax serum.

(2) Discarding of the old system of "hyperimmunisation" of serum producers, hitherto regarded as indispensible, but now found to be quite unnecessary, and that immune animals (buffaloes) could furnish a satisfactory serum (rinderpest) for a period extending over three months by merely adjusting the dosage of serum administered to them in the initial treatment with virus and serum simultaneously, so that they exhibited a decided febrile reaction.

The old system of hyperimmunisation has been entirely abandoned, also in respect to the manufacture of hæmorrhagic septicæmia serum, in favour of "a very cheap and rapid method by the simultaneous inoculation of the producers (buffaloes), with a large initial dose of culture of living antigen of low virulence and a suitable counteracting dose of serum," and "curiously, rigorous tests have proved that the use of antigen of low virulence leads to the production of an anti-serum of as high potency as that obtained after the use of highly virulent antigen."

It is very satisfactory to note the pains which are being taken to develop the practicability of the serum-simultaneous method of inoculation against rinderpest, a system which has been adopted in Army Transport and in Government-owned establishments. Records are available showing 1,422 inoculations by this process with 14 deaths, largely accounted for by accidental development of acute piroplasmosis (*P. bigeminum*). It is, however, hoped, as mentioned in the report, to eliminate or avoid this complicating danger by the production of virulent material for the inoculation under laboratory supervision. The difficulty of supplying virus in an active and virulent condition seems to have been greatly overcome by issue in small sealed bottles. It has also been shown that a powerful and durable immunity can be readily set up in very young calves by the simultaneous method, and there is evidence enough to support the adoption of it in young indigenous cattle (under two years, as at the Imperial Cattle Breeding Farm, Karnal), in which animals there is a higher resistance to the effects of piroplasmosis.

Following MADSEN'S experience at the State Serum Institute, Copenhagen, in regard to repeated injections of small quantities of inorganic salts into the blood stream to stimulate the production of specific antibodies and to increase the potency of anti-diphtheritic serum, work on similar lines has been conducted at the laboratory and an attempt has even been made to introduce salt injection as a routine practice, but at the time of the issue of the report it was not possible to express any decided opinion on the merits or otherwise of the practice.

Another complicating circumstance arising from rinderpest is the resuscitation which that disease occasions to bovine coccidiosis. It seems that the intestinal mucosa is so depressed by the disease that the proliferation of and invasion by coccidia assume serious proportions. Investigation goes to show that coccidiosis is a widespread affection in India and in a large number of animals and birds.

Very successful results are evidenced from both hæmorrhagic septicæmia serum and vaccine. The latter was employed preventatively on a large scale in the Punjab, following the heavy monsoon season.

The old "pillule" system of vaccination against blackquarter in cattle, which has rendered signal service for many years, continues in vogue, both in the provinces and Indian States, but in view of the advances made in prophylaxis in this disease in recent years steps have been taken to test the efficiency of the more modern methods relating to "germ free" products. Germ free (broth culture) filtrate, aggressin, and a mixture of filtrate and aggressin have been prepared and issued, to the Punjab and Central Provinces chiefly. Blackquarter serum, too, was prepared and issued at the request of the Bombay Presidency.

Anthrax serum only is used, intervention against the disease being confined to actual outbreaks and notably among equines. Research in respect to the efficacy of vaccines under Indian conditions is, however, proceeding. A spore vaccine manufactured by an Australian commercial firm appears to have successfully controlled and prevented recurrence of the disease amongst the hounds of the Bombay Hunt, and it seems also to be very effective in protecting sheep against subsequent virulent injection.

It is interesting to record that the agglutination test reveals the fact that 50 per cent. of the milch cows of some of the Government Military Dairies are affected with contagious bovine abortion and that 20 per cent. abort. Test of "grantee" farms of the Punjab under natural conditions of stock-raising shows about 10 per cent. of injection and no abortion.

Enquiry into incidence and susceptibility of bovine tuberculosis in India indicates that, while Indian breeds of cattle are no more resistant to the disease than mixed European breeds ($\frac{1}{2}$ to $\frac{7}{8}$ European), and that strains of tubercle bacilli isolated display an equal degree of virulence to British strains, the low degree of incidence in India is remarkable, and for the information of European scientists the report is worth quoting:—"However, the information such as is now available would seem to indicate that the very low incidence of bovine tuberculosis in India (about 3 per cent., with small localised lesions, at Ferozepore and Cawnpore slaughterhouses, but generally much rarer), is attributable to the manner in which the cattle are generally maintained in the country—in the open, with ample opportunity for destruction of the virus voided by carriers—and not to any specially lower virulence possessed by the causal organism, and probably not to any specially high resistance of the cattle themselves."

Investigation carried out by the Laboratory would appear to indicate that Johnë's disease is a serious affection in certain important herds in Southern India, and systematic tests with avian tuberculin to determine the degree of incidence are being arranged.

Doses of intra-dermo-palpebral mallein to the number of 62,070 and 25,765 doses of the subcutaneous mallein were manufactured during the year, the greatest customer being the military department. The latter will certainly appreciate the supply of the intra-dermo-palpebral variety, which was used so extensively and successfully during the war. The statistical tables also show that this system of testing is greatly favoured by the laboratory itself.

Very complete and ably carried out experimental treatment with streptococcic products to devise means for controlling strangles at the Army Remount Depôts of Mona and Sargodha, and the Stud Farm Ahmednagar, were continued from the previous year. The report deals with the subject very extensively, and resultant indications seem to be that other means than streptococcic products should be resorted to in combating strangles. As stated in the report "the belief has already been expressed by certain workers that the disease is set up by an "ultra-visible virus" as the initial causal agent, with streptococci as mere secondary invaders."

No progress was made with regard to foot-and-mouth disease. The work of Frosch and Dahmen could not be substantiated, and the method of vaccination advocated by Roux, Vallée, Carré and Nocard (use of stored virulent serum) did not suffice to prevent 40 experimental bulls from contracting the disease a fortnight after.

The tried favourites surra and piroplasmosis were not enlarged on in the report, for the reason no doubt that they have been so extensively dealt with in the past. Sheep pox, too, awaits an awakening interest. It is physically impossible to tackle all the veterinary problems of India. Indeed, one wonders at the vast amount that has been achieved, and the patient toil of it all by the Director of the Institute and those associated with him is fully deserving, not only of the thanks of the Government, of which they are servants, but of the appreciation of the profession to which they belong.

The report is well supported by statistics which not only show the benefits derived from the use of the different products issued from the Institute, but are a ready means of showing the Provinces or parts of India where the greatest incidence of disease lies.

J. M.

Glasgow Veterinary College.

"The sixteenth annual report of the Glasgow Veterinary College since its incorporation appears," says *The Glasgow Herald* of 21st September, "on the day on which the new session opens at the College. The withdrawal of Government grants necessitated the launching of a special fund by the Governors, and the report notes that of the total sum aimed at (£30,000) the public appeal has resulted in £8,016 10s. being contributed up to date. In view of the difficulties which the College has had to face owing to the attitude of the Government, the report notes with pride the results attained by students at examinations during the past year. It is believed that these results constitute a 'record' not only for the College, but for all other colleges in the British Isles. The results are summarised as follows:—Passes—this year, 77 per cent.; best previous year 1922-23, 76 per cent.; average of the last seven years, 70 per cent. Honours—this year, 27.7 per cent.; best previous year 1924-25, 25.4 per cent.; average of the last seven years, 16.1 per cent. The results reflect great credit on the students and the teaching staff.

"The Animal Diseases Research Association left the College on June 1st last. In accordance with arrangements entered into when the Association was formed, they have handed over to the College valuable equipment and fixtures which will greatly improve the work of the pathology department. The rooms which have been vacated by the Association are now being utilised to provide (1) a separate class room for biological teaching; (2) a students' library and reading room, separate from the students' common room; (3) a series of four rooms devoted to pathology instead of one room as hitherto;

(4) an anatomy laboratory twice as large as that hitherto in use. Two women students entered the College in September, 1925. Both have now passed their Class A examination, one with honours. It seems probable, the report states, that one or two other women will enter the College for the session which opens to-day.

"Gratification is expressed that the grants from town and county councils and Education Authorities show an increase over the amount of the grants for last year. A further list of subscribers to the special appeal fund includes the following:—Lord Woolavington, Lavington Park, Sussex, £2,000; Mr. A. A. Hagart Speirs, of Elderslie, £1,000; Mr. James Russell, Castlehill, Hamilton, £1,000; Mr. Walter W. Blackie, B.Sc., £500; Mr. W. H. Coats, Woodside House, Paisley, £500; Messrs. Gow, Harrison and Co., shipowners, Glasgow, £250; Mr. W. Betts Donaldson, Auchenedeu, Strathblane, £100; Mr. Andrew Hunter, Saint Brydes, Howwood, £100; Mr. G. H. Russell, The Burn, Edzell, Brechin, £100; Mr. Alex. Whitelaw, of Gartshore, £100; Mr. William Whitelaw, of Adamton, £100; Mr. Charles M. Collins, Rowardennan Lodge, Loch Lomond, £100; Mr. Robert C. Marshall, Burntshields, Kilbarchan, £100; Mr. David M'Cowan, Royal Exchange, Glasgow, £100; Messrs. Wordie and Co., Glasgow, £100; County Council of Renfrew, £100; Dr. A. W. Whitehouse, Glasgow Veterinary College, £50; Captain D. E. Wallace, M.C., M.P., of Kildonan, £50; Mr. Harold Glen Coats, Achnamara, Lochgilphead, £50; 'A Friend,' per Mr. Walter W. Blackie, B.Sc., £50; Ayrshire Agricultural Association, £50; County Council of Bute, £50; County Council of Ayr, £50; etc.

"The prize distribution at the College will take place on Wednesday, October 20th."

DIVISIONAL REPORT.

Midland Counties' Division.

MEETING AT BIRMINGHAM.

The quarterly meeting of the Midland Counties' Division was held at the Grand Hotel, Birmingham, on Friday, September 3rd. The President (Mr. J. O. Powley) occupied the Chair and the other members present were:—Messrs. Brennan De Vine (Birmingham), L. W. Heelis (Solihull), J. W. Conchie (Kidderminster), H. W. Steele-Bodger (Tamworth), L. C. Tipper (Birmingham), W. F. Aston (Shrewsbury), J. R. Barker (Hereford), H. Tudor Hughes (Oswestry), W. H. Brooke (Handsworth), H. W. Dawes (West Bromwich), R. Murray (Rugeley), A. A. Forsyth (Cannock), E. Beaumont (Bishop's Castle), G. R. Benbow (Leicester), T. N. Gold (Redditch), R. L. Phillips, (Loughborough), G. V. Tyerman (Ludlow), F. E. Somer (Birmingham), J. M. Whyte (Tenbury), F. L. Gooch (Stamford), H. L. Pemberton (Bridgnorth), F. Chambers, (Wolverhampton), T. Marriott (King's Norton), H. Yeomans (Smethwick), J. Martin (Wellington), W. L. Sheffield, and the Hon. Secretary (Mr. H. J. Dawes, West Bromwich). The visitors present were Messrs. A. W. Noel Pillers (Liverpool), G. T. Matthews (Norwich), G. Leader (Kidderminster), J. W. Davis (Birmingham), T. A. Elam (Birmingham), A. J. Kennedy (Birmingham), A. L. Bragg (Birmingham), L. Jordan (West Bromwich), J. C. Naylor (Birmingham), O. V. Gunning (Tutbury), and P. D. Bayliss (Birmingham).

Apologies for unavoidable absence were announced from the following:— Professors Penberthy and Hobday, Colonel Walker, Messrs. W. L. Cockburn, S. M. Woodward, F. T. Prince, T. Ludlow, T. J. Brain, L. C. Maguire, M. Tailby, E. Ringer, W. C. Blackwell, Trevor Spencer, C. Marriott, R. Lake, W. Dale, W. J. Dale, E. Franklin, J. T. Allen, T. Chambers, T. H. Hobson, G. Eaton, H. S. Cockburn, R. Hughes, W. F. Banham, and others.

The *minutes* of the previous meeting were read and confirmed.

Nomination.—Mr. W. L. SHEFFIELD nominated for membership of the Division, Mr. P. D. Bayliss, of the Board of Agriculture's Veterinary Staff, stationed at Birmingham.

Election.—On the motion of the PRESIDENT, seconded by Mr. H. TUDOR HUGHES, Mr. Ambrose Robertson, of Stourbridge, was unanimously elected to membership of the Division.

Next Meeting.—The HON. SECRETARY reported that at a meeting of the Council, held earlier in the day, a recommendation was made that the next quarterly meeting of the Division be held at Tamworth, with a view to visiting the model farm of the local Co-operative Society, that Mr. Matthews, of the Liverpool Corporation staff, be invited to give an address on the Tuberculosis Order; and that a sub-committee consisting of the President, the Hon. Secretary and Mr. Steele-Bodger, be appointed to carry out the necessary arrangements.

This was agreed to unanimously.

A paper by Mr. A. W. NOEL PILLERS, entitled "Some Aspects of Diagnosis," which had been printed and circulated in advance, was then declared open for discussion.

[Mr. Pillers' paper, together with the discussion, appear elsewhere in this issue.—ED.]

VOTES OF THANKS.

At the close, the PRESIDENT moved a vote of thanks to Mr. Pillers for his paper, which had proved of the highest educational value to all of them.

The Hon. SECRETARY, in seconding, said he was prepared for something out of the ordinary from Mr. Pillers, and he was glad to say he had not been disappointed.

The vote of thanks was carried by acclamation, and Mr. Pillers said his best reward was the very great interest which had been shown in the subject by such a big meeting.

The members afterwards had tea together.

H. J. DAWES,
Hon. Secretary.

NOTES AND NEWS.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events.

Oct. 6th. N.V.M.A. Council and Committee Meetings.
Oct. 7th. R.C.V.S. Committee Meetings.
Oct. 8th. R.C.V.S. Council Meeting.
Oct. 12th. Meeting of the Derbyshire Division, at Derby.
Oct. 14th. Annual General Meeting of the Central Division at 10 Red Lion Square, W.C.
Oct. 21th. Meeting of the North Wales Division, at Chester.

National Veterinary Medical Association of Great Britain and Ireland.

Clinical Prize Scheme for Students.

Students who are eligible to participate in the above scheme are reminded that their notes must be in the hands of the General Secretary, N.V.M.A., 10 Gray's Inn Square, London, W.C.1, by Thursday, 7th October, 1926.

Foot-and-Mouth Disease.

On the recommendation of the Livestock and Wool Committee, the Council of the National Farmers' Union have endorsed the following resolution passed by the Committee: "This Committee is of the opinion that a revised basis of compensation should be adopted in the case of all animals showing visible symptoms of the disease at the time of the diagnostic visit of the veterinary inspector of the Ministry or of the Local Authority, whichever is first, when subsequent examination shows that at the time of such diagnostic visit the visible lesions are twenty-four hours or more old. The Committee thinks that there should be a uniform deduction of 10 per cent. from the full value as now determined in respect of all such animals."

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"Ministry of Agriculture officials were to-day," says *The Evening News* of September 24th, "trying to find out how foot-and-mouth disease had reached London, while on a pyre the pedigree herd of cattle belonging to Dr. H. Corner, of Southgate, was blazing within eight miles of Charing Cross.

"Dr. Corner has kept Jersey cattle for 25 years. He began with two or three cows in order to supply their rich milk to invalids and infants. As the demand grew so did the herd, until some scores of cows were required to keep the dairy going.

"A day or two ago, when milking time arrived and the cows were being driven in from the pastures, one of them was noticed to be showing symptoms of distress. A veterinary surgeon was called and diagnosed the trouble as foot-and-mouth disease. His opinion was later confirmed by an expert from the Ministry of Agriculture.

"Only six cows were infected, but yesterday 42 animals were slaughtered, and to-day 17 more were also sacrificed. The total value of the slaughtered animals is estimated at £3,000."

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"Is the agricultural show of to-day out of touch with practical tenant farming conditions?" asks the agricultural correspondent of *The Liverpool Post and Mercury*. "Farmers blame committees, and committees accuse farmers when it is found that entries of farm stock, produce, and crops are down. Both deplore the uncertainty caused by foot-and-mouth disease outbreaks, which is really the greatest single factor in the so-called decline, which some read as the sentence of doom.

"Each summer practical agricultural entries shrink. When Burnley announced record entries for its Royal Lancashire Agricultural Show in July, cattle, horses, pigs, dairy, and local classes were down, but rabbits were up by 447 and dogs by 764. At the Chester County Show, there was a small reduction in essential entries, and the same applied to the Wirral and Altrincham Shows. The following table shows the actual position this year:—

	Total entries.	Farm entries.
Burnley	5,905	1,686
Chester	3,484	1,073
Wirral	2,092	368
Altrincham	7,447	2,364

"In the last three, the movement of stock, owing to foot-and-mouth disease, was restricted until nearly the day of the show.

"Foot-and-mouth disease is responsible for much of the decline. Many useful herds were sacrificed, and years of skilled effort are needed to build up a high beef or dairy standard. This year the young stock certainly shows considerable improvement, and the outlook is rosy. There is an increasing demand for best heavy draught horses for town work, and this, in due time, will influence shows as well as fairs and markets."

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Foot-and-mouth disease has again broken out in Northamptonshire on a farm at Wellingborough, nine cows being affected. The whole herd of 26, in addition to a bull, has been destroyed. All markets within a 15 mile area have been closed.

Crystal Palace Dog Show.

The great dog show held this week at the Crystal Palace was the 65th promoted by the Kennel Club since its foundation over 50 years ago. Since the first dog show was held at Newcastle-on-Tyne, in 1859, interest has widened enormously. That was confined to pointers and setters; on Wednesday representatives of 73 breeds and varieties were shown, and there were also classes for foreign dogs that are not granted a separate classification. Women constituted the majority of exhibitors, many of them holding their own with the men in sporting breeds and terriers, while they are the principal exhibitors of toys.

Of the total entry of 5,713 dogs, Alsatians numbered 544, which was 130 in excess of cocker spaniels, the next strongest. Several other foreign breeds are evidently growing in favour, judging by the support they received at this show, notably elkhounds, the sporting dogs of Scandinavia, the Afghan hounds, some of which have been imported from Kabul, and Salukis, probably the most ancient members of the greyhound family. Dachshunds were well in advance of previous years. Among British dogs, gundogs, terriers, bulldogs, and Irish wolfhounds were largely entered.

The Editor acknowledges the receipt of the following:—

Communications from Mr. F. T. Harvey, Lt.-Colonel H. T. Ryan and Mr. D. E. Wilkinson.

Report of a meeting of the North Wales Division, from Mr. J. H. Wynne, Hon. Secretary.